Attachment
Draft BHHRA Comment 154 – EPA Suggested Replacement Text

7.3.6.1 Tier 3 Cancer Slope Factor for TCDD-TEQ

Dioxins and furans occur in the environment in complex mixtures. Although the members of this family of chlorinated compounds are considered to have a common mechanism of action, they differ in potency. By far, the most toxic and the most extensively studied of the group is 2,3,7,8-TCDD (TCDD). The toxicity of this congener is used as a reference point for evaluating the other compounds (USEPA 2010). TCDD was a major contributor to the cancer risks and non-cancer health hazards at the site from ingestion of fish and crabs.

In the absence of a Tier 1 – IRIS Toxicity Value, a Tier 3 value was selected as described below. For the update on the status of EPA's ongoing reassessment of dioxin CSF please refer to www2.epa.gov/iris.

Currently, consistent with USEPA's toxicity values hierarchy guidance (2003a), a Tier 3 CSF was selected to calculate cancer risks from exposure to dioxin TEQ. Several potential Tier 3 CSFs for 2,3,7,8-TCDD have been listed in the response to #44 of the Frequently Asked Questions for USEPA's Regional Screening Levels table (USEPA 2013b). Of the listed values, two are not considered further here for the following reasons: (1) the Minnesota CSF was based on an EPA reassessment that has not been finalized; and (2) the Michigan CSF has limited publicly available information. A brief description of the other Tier 3 cancer slope factors is provided below.

- *USEPA (1985)*
  USEPA's Office of Health and Environmental Assessment (currently the National Center for Environmental Assessment) developed an oral CSF for 2,3,7,8-TCDD of 156,000 $(mg/kg\text{-}day)^{-1}$ (USEPA 1985).

- *USEPA (1997b)*
  - USEPA's Health Effects Assessment Summary Table, or HEAST, provides an oral CSF of 150,000 $(mg/kg\text{-}day)^{-1}$ (USEPA 1997b).
  - HEAST cites the1985 EPA Health Assessment Document described above.

- *California Environmental Protection Agency (2002)*
  California Environmental Protection Agency (CalEPA), Office of Environmental Health and Hazard Assessment provides an oral CSF of 130,000 $(mg/kg\text{-}day)^{-1}$ for TCDD (CalEPA 2002).

The 3 dioxin CSFs range from 130,000 to 156,000 $(mg/kg\text{-}day)^{-1}$. These differences in CSF will not significantly change the results of the risk assessment. For example, looking at the calculated cancer risks from exposures to dioxin TEQ through fish consumption would result in the following changes in the calculated risks.

Fish Tissue – Common Carp	Intake Exposure	Cancer Slope Factor	Total Risk
TCDD-TEQ	1.91 x 10-8	130,000	2.48 x 10-3
TCDD-TEQ	1.91 x 10-8	150,000	2.87 x 10-3
TCDD-TEQ	1.91 x 10-8	156,000	2.98 x 10-3

As shown in these calculations, the change in the calculated risks does not change the overall conclusion that the NCP risk range was exceeded, supporting the need for remedial action at this site.

Based on the sensitivity analysis above, and the fact that the analysis in the EPA IRIS PCB Cancer Reassessment (1996) of dioxin-like PCBs utilizes the HEAST slope factor, the HEAST CSF was the Tier 3 CSF selected for this site.

TCDD RfD

Consistent with the OSWER Directive regarding the selection of toxicity values, a Tier 1 toxicity value for 2,3,7,8-TCDD was selected to calculate the non-cancer health hazards. The IRIS RfD for 2,3,7,8-TCDD is 7×10^{-10} mg/kg-day and this was used in the calculation of non-cancer hazards associated with dioxin TEQs.

Dioxin TEFs

The calculation of dioxin TEFs followed the U.S. Environmental Protection Agency (EPA) Office of Science Advisor's Risk Assessment Forum's document titled *Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds* (EPA 2010). This document recommended the 2005 WHO consensus TEFs.

Arsenic

The assessment relied on the toxicity values in the Integrated Risk Information System (IRIS), a Tier 1 toxicity value identified in the OSWER directive, as the basis for evaluating the cancer risks and non-cancer health hazards from exposure to IRIS. Currently, EPA is re-evaluating the toxicity of arsenic through the IRIS process and it is premature to prejudge any potential changes to this toxicity value.